

## **Part III. Use of the pneumograph (respiratory transducer) to determine factors that influence the rate and depth of breathing**

**In lab 6 (respiratory physiology) we used the respiratory transducer (a belt fastened around the chest) to record chest movements as a subject breathed. The numbered heading below correspond to the headings in your lab supplement.**

- Set up (lab supplement)**
- Determining resting breathing**
- Examining modified breathing patterns**
- Effects of exercise (skipped for my recording)**
- Effects of Altered Blood Chemistry**

**I posted my recordings as I performed the activities in Part III so everyone has an opportunity to see the recordings.**

**The recordings include: normal breathing, breathing while yawning, coughing, and sneezing, and experiments on the regulation of breathing by blood chemistry.**

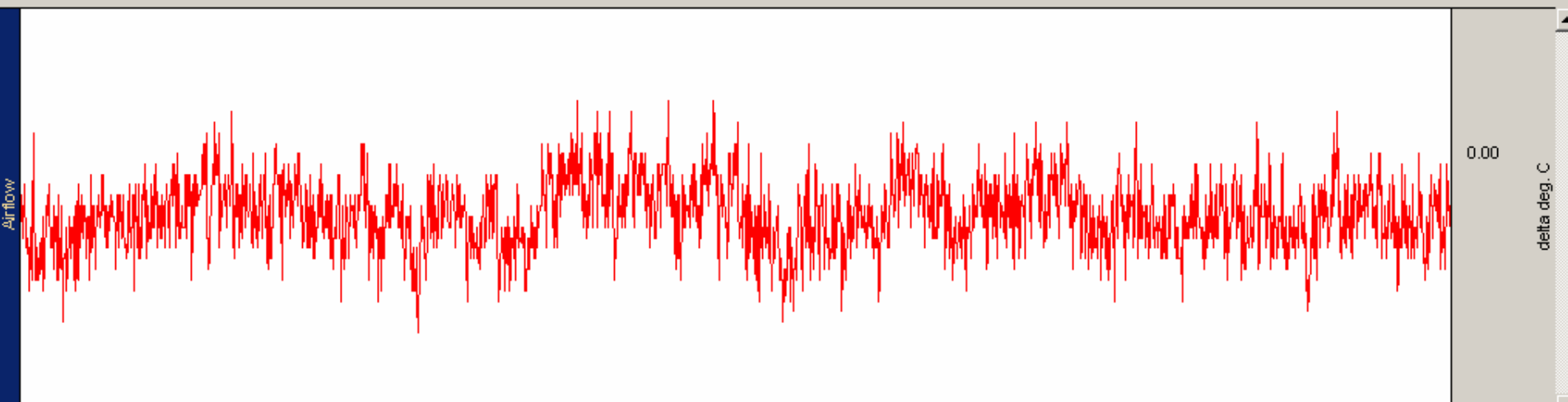
**Note that the DAS recorded two channels, airflow (calculated, not actual) and respiration (actual). Pay attention to the respiration (**blue line**) only.**

Overlap Split

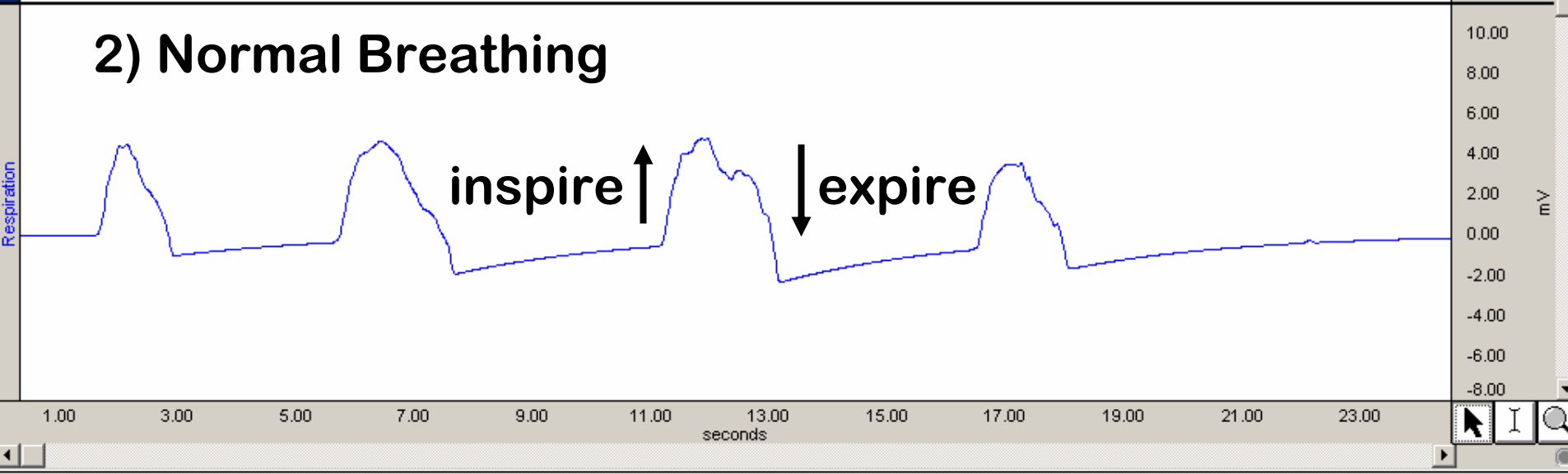
40 delta T \*\*\*\* 40 bpm \*\*\*\* 40 p-p \*\*\*\* 2 p-p \*\*\*\* 2 none

2 40 Airflow

Seated and relaxed



## 2) Normal Breathing

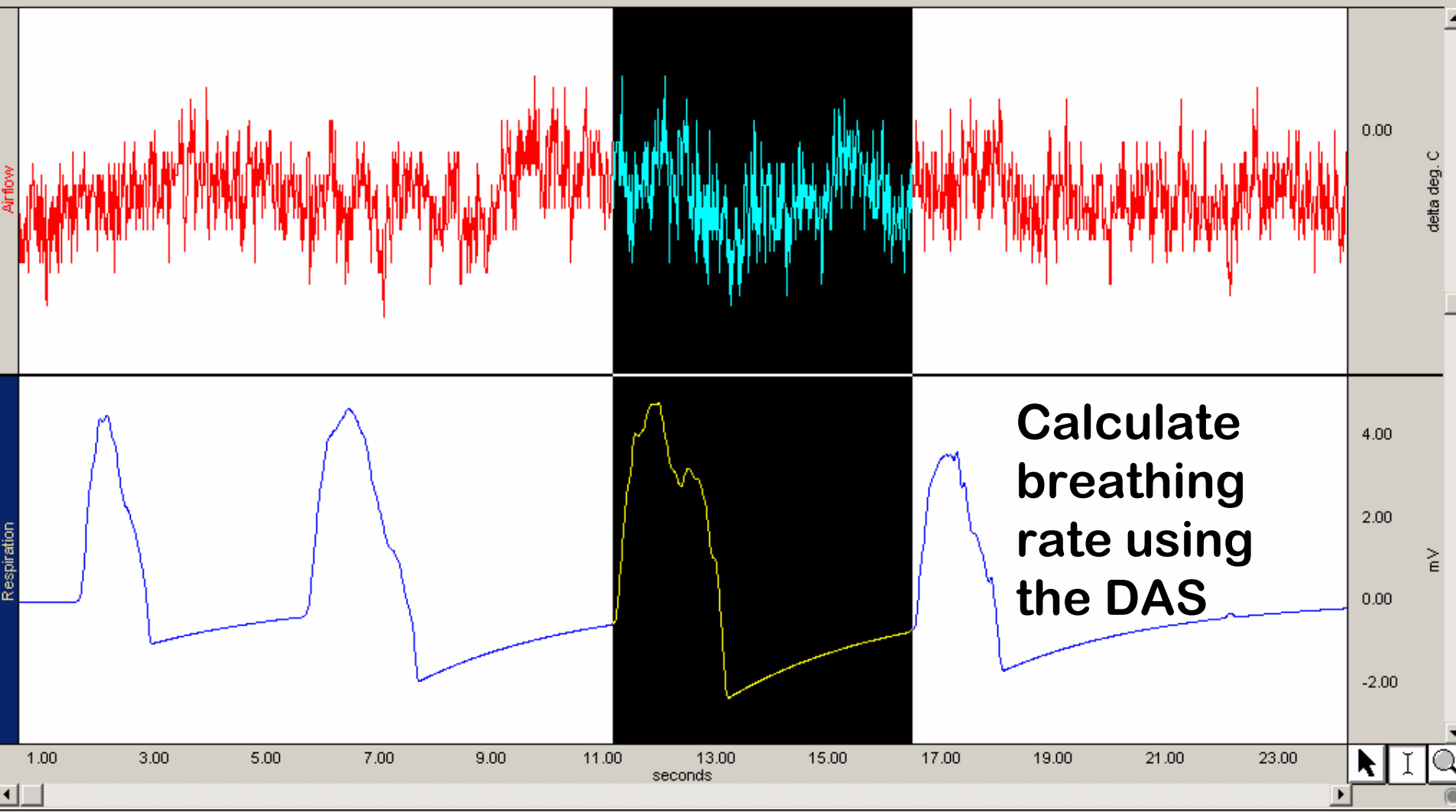


Overlap Split

40 delta T 5.33000 sec 40 bpm 11.25704 BPM 40 p-p 7.14334 mV 2 p-p 0.03589 delta 2 none

2 40 Respiration

Seated and relaxed

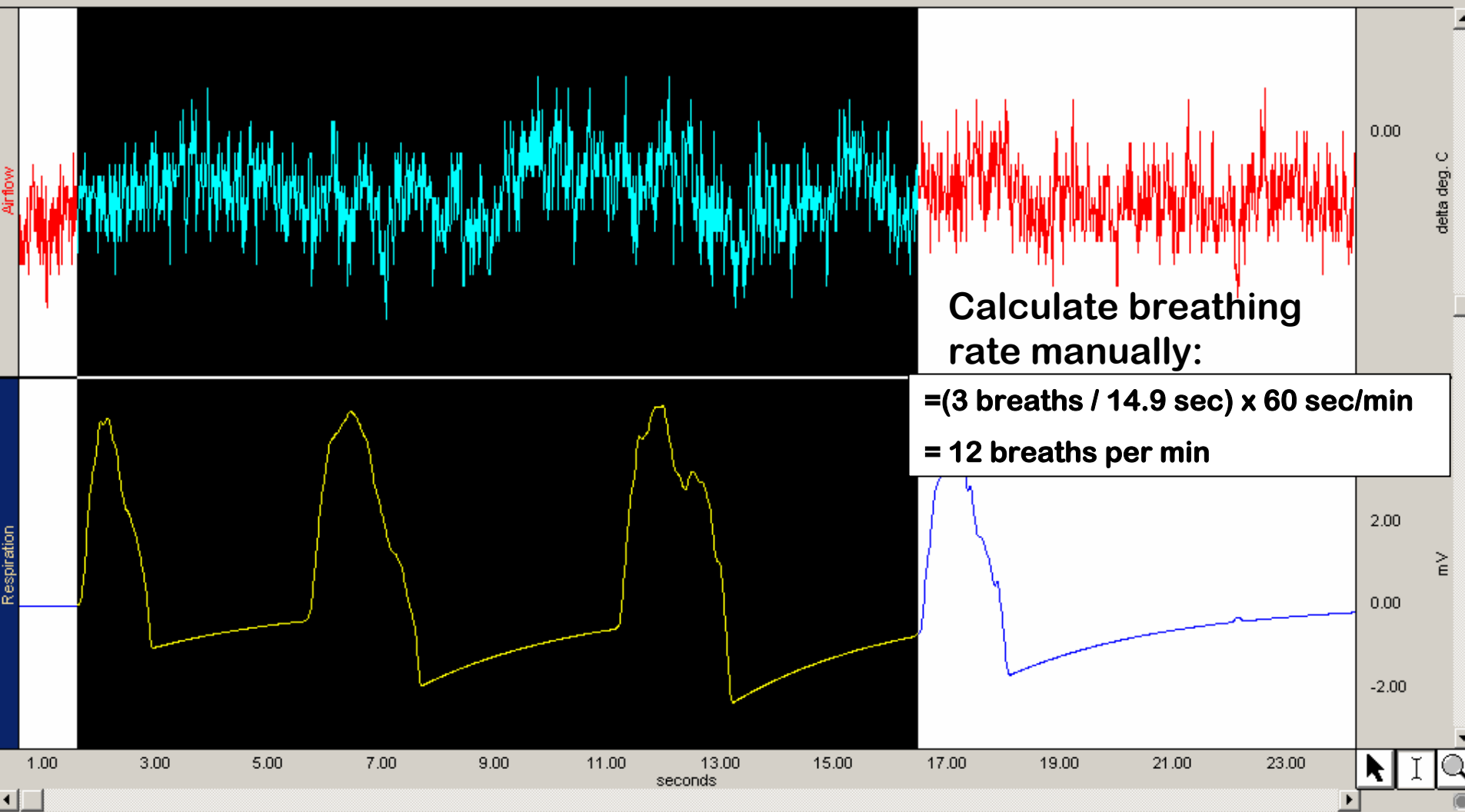


Overlap Split

40 delta T 14.89000 sec 40 bpm 4.02955 BPM 40 p-p 7.14334 mV 2 p-p 0.03760 delta 2 none

2 40 Respiration

Seated and relaxed



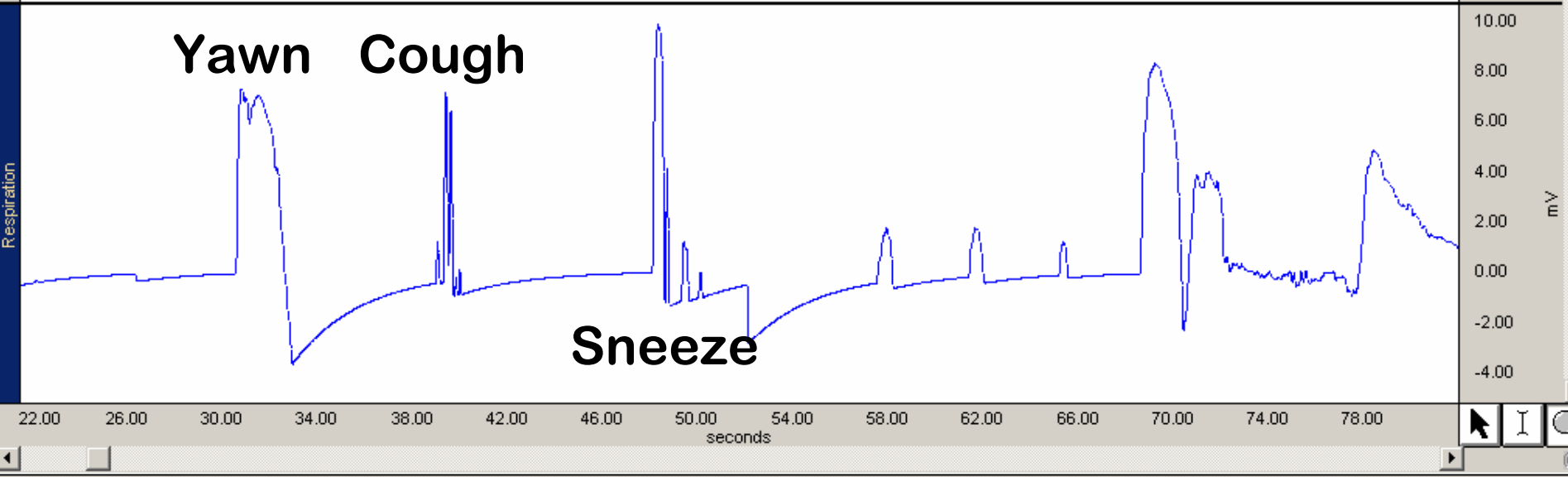
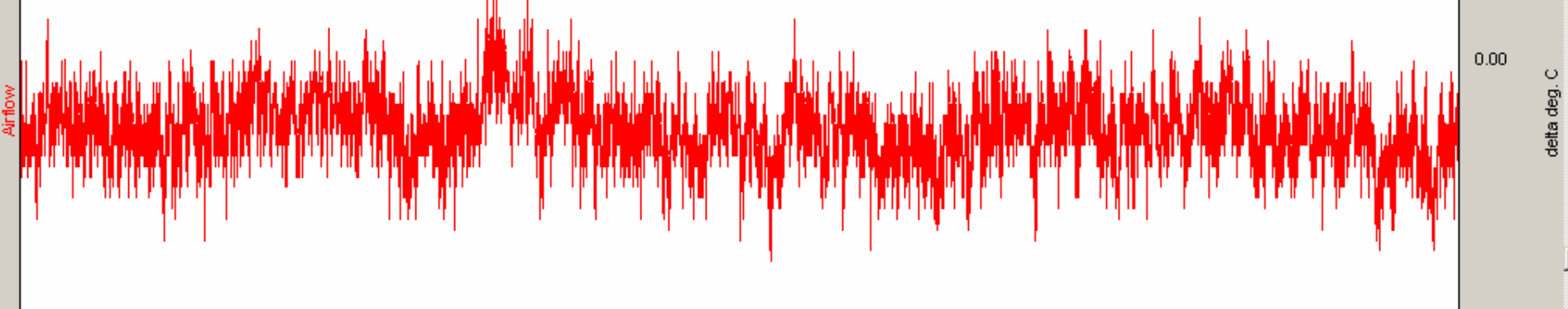
Overlap Split

40 delta T \*\*\*\* 40 bpm \*\*\*\* 40 p-p \*\*\*\* 2 p-p \*\*\*\* 2 none

2 40 Respiration

Seated and relaxed

### 3) Examining modified breathing patterns



## 5) Altered blood chemistry

The next three slides will show you the results of the experiments using breath-holding exercises.

The premise of the experiment is a simple application of what we've discussed in lecture, the higher the blood  $\text{PCO}_2$  the greater the  $\text{CO}_2$  drive forcing you to breathe. **How should blood chemistry and  $\text{CO}_2$  drive impact the duration of breath-holding?**

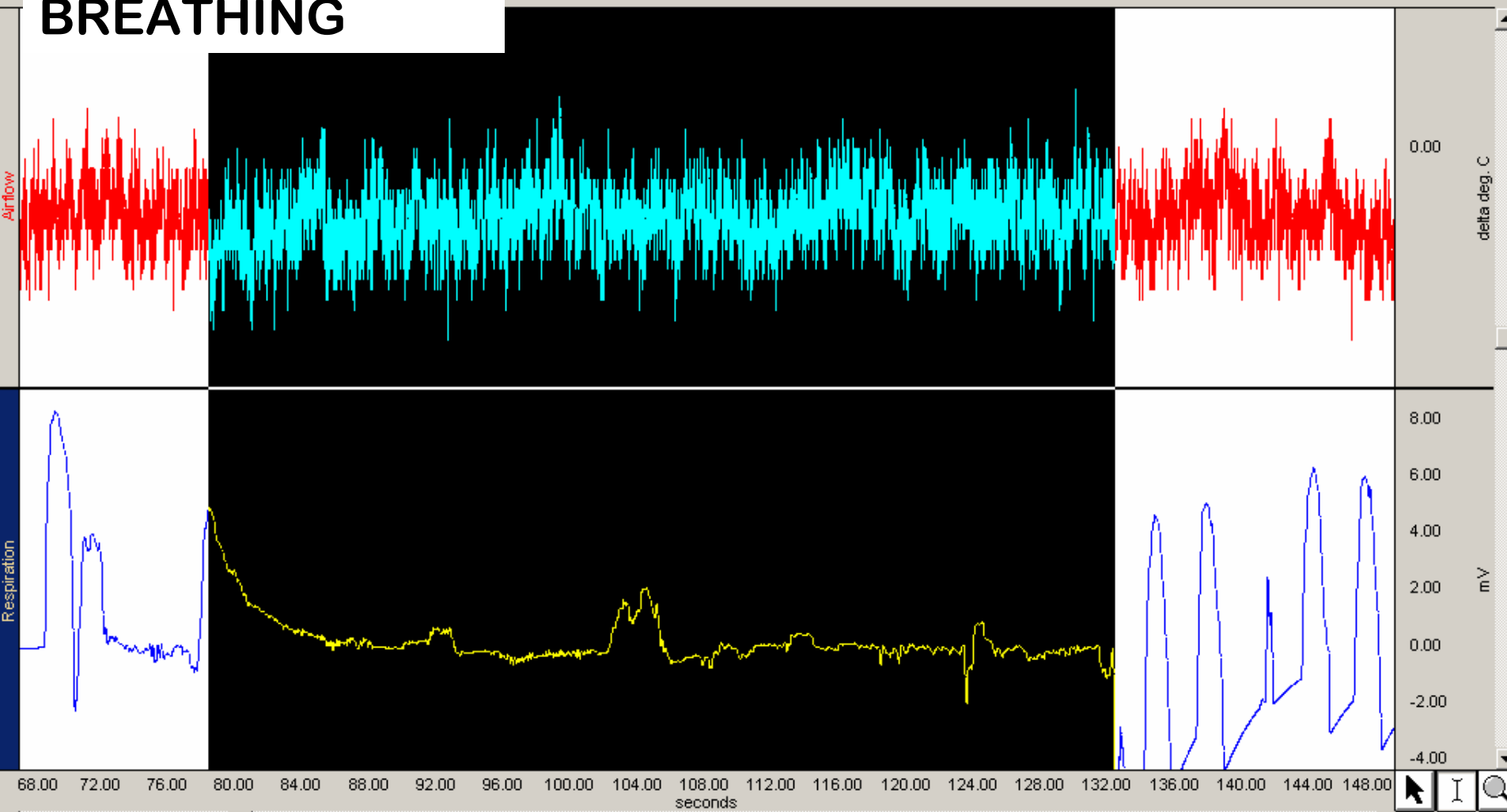
The highlighted area is the duration of breath-holding. The first is breath-holding after normal breathing (control), next is breath-holding after hyperventilation, and last is breath-holding after re-breathing air from a bag.

Use some paper to **record the duration (delta T in sec) from the measurement boxes** of each of the experimental conditions.

Overlap Split

40 delta T 54.08000 sec 40 bpm 1.10947 BPM 40 p-p 10.97379 mV 2 p-p 0.04272 delta 2 none

# NORMAL BREATHING

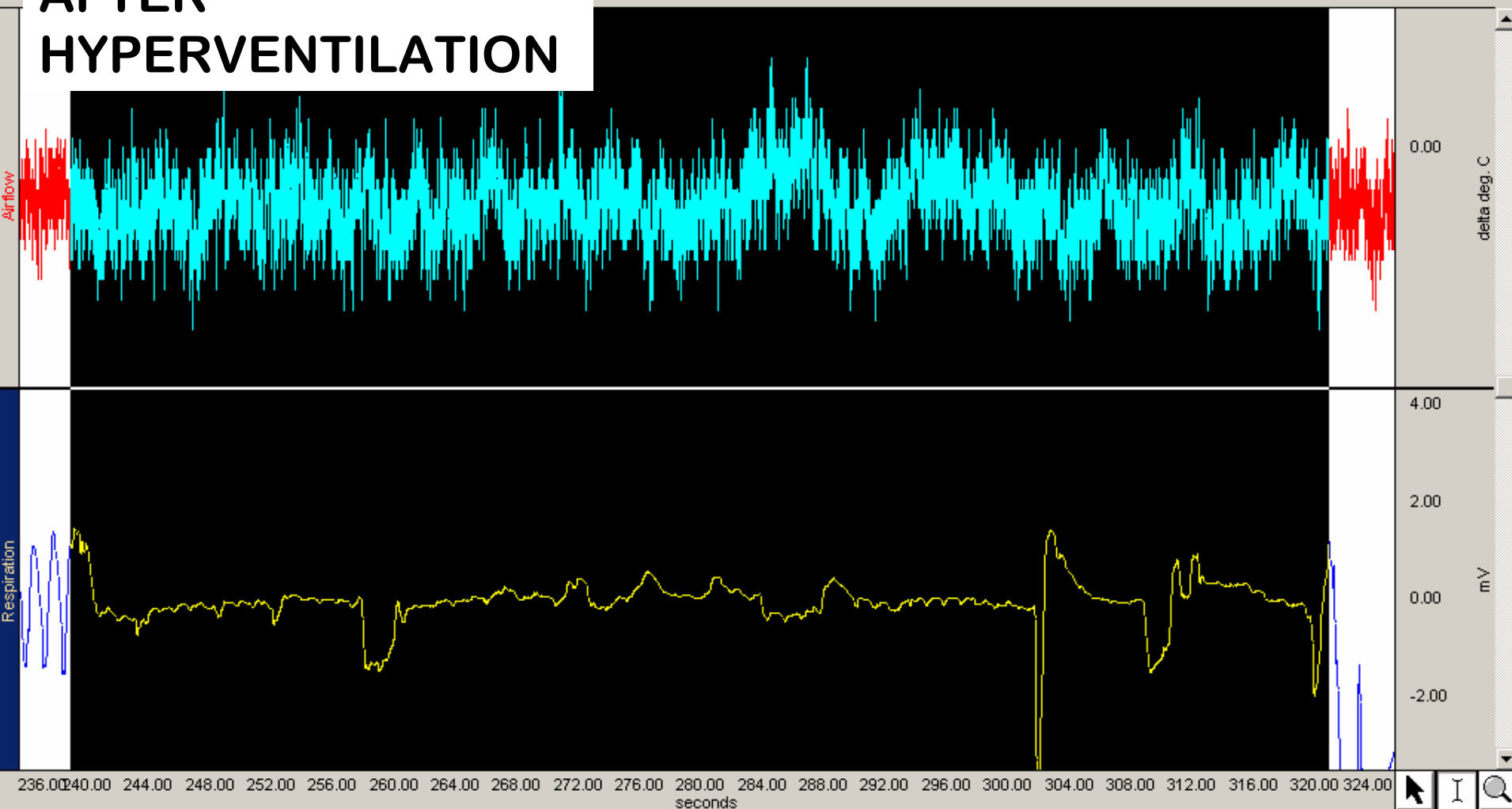


Overlap Split

40 delta T 82.11000 sec 40 bpm 0.73073 BPM 40 p-p 5.35908 mV 2 p-p 0.04614 delta 2 none

2 40 Respiration

# AFTER HYPERVENTILATION

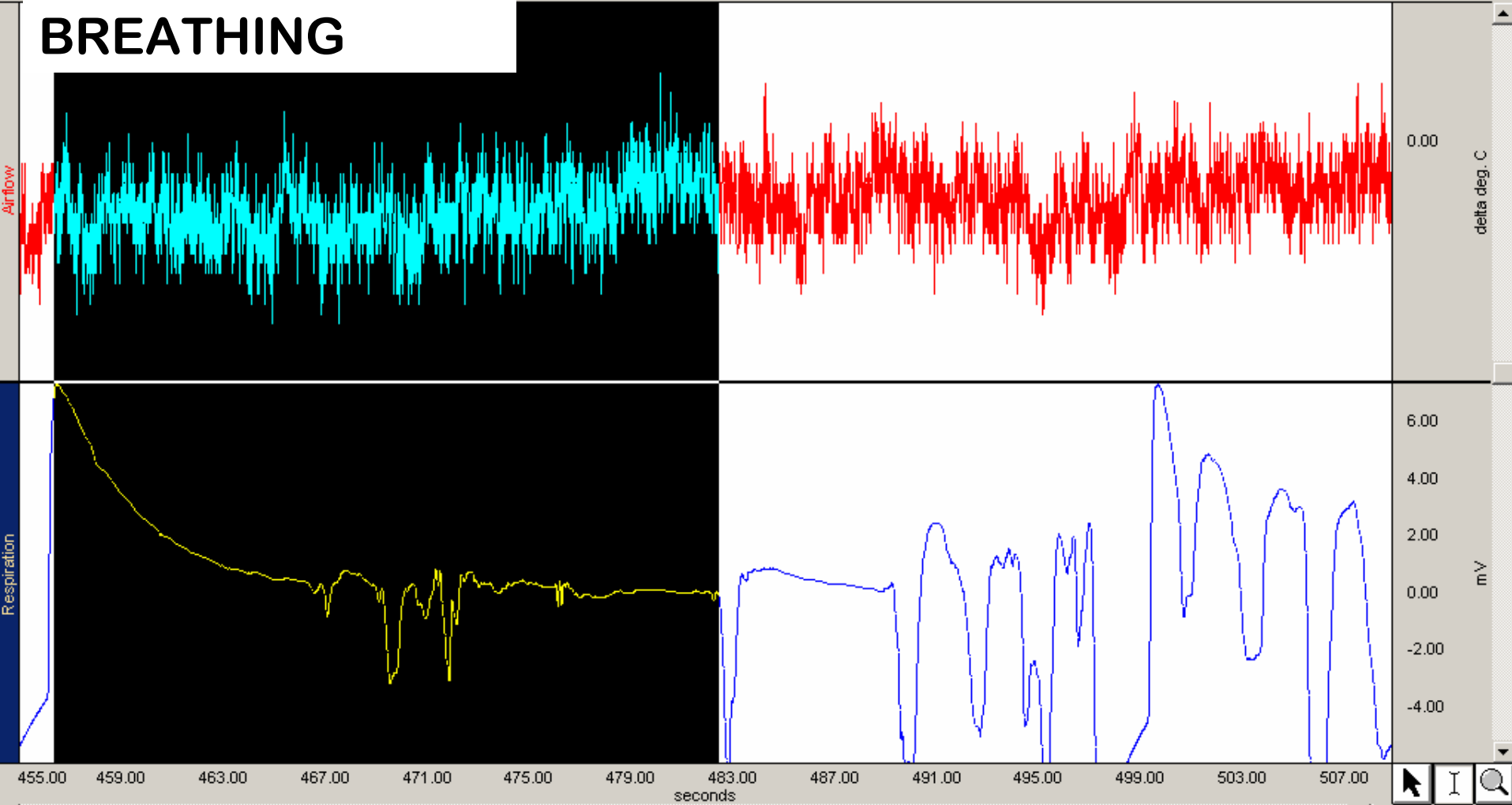


Overlap Split

40 delta T 26.14000 sec 40 bpm 2.29533 BPM 40 p-p 10.51619 mV 2 p-p 0.04272 delta 2 none

2 40 Respiration

# AFTER BAG BREATHING



**Think about it:**

In which trial could the subject hold his breath for the least amount of time?

after hyperventilation OR after bag breathing

In which trial was the arterial blood  $P_{\text{CO}_2}$  highest at the onset of breath-holding?

after hyperventilation OR after bag breathing

In which trial was the  $\text{CO}_2$  drive greatest at the onset of breath-holding?

after hyperventilation OR after bag breathing